Identifying Satisfaction Factors in Tertiary Education: The case of an Information Systems Program

Completed Research Paper

Taizan Chan
School of Information Systems,
Queensland University of Technology
2 George St. Brisbane QLD, Australia
t.chan@qut.edu.au

Michael Rosemann
School of Information Systems,
Queensland University of Technology
2 George St. Brisbane QLD, Australia
m.rosemann@qut.edu.au

Tan Shiang-Yen
School of Information Systems,
Queensland University of Technology
2 George St. Brisbane QLD, Australia
S40.tan@qut.edu.au

Abstract

This paper introduces a modified Kano approach to analysing and classifying quality attributes that drive student satisfaction in tertiary education. The approach provides several benefits over the traditional Kano approach. Firstly, it uses existing student evaluations of subjects in the educational institution instead of purpose-built surveys as the data source. Secondly, since the data source includes qualitative comments and feedback, it has the exploratory capability to identify emerging and unique attributes. Finally, since the quality attributes identified could be tied directly to students' detailed feedback, the approach enables practitioners to easily translate the results into concrete action plans. In this paper, the approach is applied to analysing 26 subjects in the information systems school of an Australia university. The approach has enabled the school to uncover new quality attributes and paves the way for other institutions to use their student evaluations to continually understand and addressed students' changing needs.

Keywords: Kano Model, Student Satisfaction, Education Quality, Student Requirements Analysis, Customer-centric Approach

Introduction

As an important sector in the services industries, many tertiary education institutions have adopted customer-centred service provision approaches to better meet student requirements and to ensure high levels of student satisfaction and retention (Ching-Chow, Sukwadi, & Pen-Po, 2010; Hwarng & Teo, 2001; Ostrom, Bitner, & Burkhard, 2011). Consequently, various customer-oriented techniques such as voice of the customer, quality function deployment (QFD), service blueprint, and the Kano model, which have been used to incorporate customer requirements into service design and provision, have been applied in the educational sector (Hwarng & Teo, 2001).

Among these, the Kano model is one of the most applied methods in studying factors that drive student satisfaction (Arefi, Heidari, Morkani, & Zandi, 2012; Bilgili & Unal, 2008; Ching-Chow et al., 2010; Liu, 2008; Rezaie, Nosratabadi, & Fazlollahtabar, 2012). It enables institutions to identify and optimally allocate resources between factors that have a positive impact and those that have a negligible or even negative impact on student satisfaction (Gruber, Reppel, & Voss, 2010; Liu, 2008). In the context of Information Systems (IS) programs, the Kano method can be used to reveal the relationship between attributes of the IS programs and students' satisfaction (Arefi et al., 2012; Bilgili & Unal, 2008; Liu, 2008; Rezaie et al., 2012). These insights enable an institution to prioritize student requirements, optimize information systems curriculum design and thus maximize students' satisfaction in Information Systems programs (Rezaie et al., 2012; Sahney, 2011).

However, the Kano model has several drawbacks in terms of its rigid data collection and analysis methods. Existing data collection methods require the development of specific instruments and confine the analysis within the scope of known attributes that must be predetermined prior to the instrument design. This inhibits discovery of new attributes and relationships that may emerge as both student expectations and the curriculum transform over time. Additionally, the number of attributes that can be reasonably analysed in a single study is often limited. Consequently, studies use high-level attributes, with each attribute serving as proxy for several lower level attributes. Such generalization tends to produce findings with low granularity making it difficult to infer what specific actions can be taken to raise student satisfaction.

The objective of this paper is to propose an extended approach to overcome these drawbacks of the existing Kano model. Firstly, the proposed method uses readily available quantitative and qualitative data from student evaluations of subjects instead of purposely built surveys as the data source. Secondly, since the data source includes qualitative comments and feedback, the approach has the exploratory capability to identify new and unique attributes that may emerge over time as student expectations change. Finally, since the attributes identified could be tied directly back to students' detailed feedback and comments, the results from the approach enable practitioners to translate the results into concrete action plans.

In this paper, the proposed method has been applied to analyse 26 subjects of an Information Systems School in an Australia university. The results obtained from this method have provided the school with actionable insights for improving teaching quality and student satisfaction. Further plans are to promote this method to the wider tertiary education community in the hope that other universities will be able to similarly derive additional value from their student evaluations.

The rest of the paper is organised as follows. Section two describes the Kano model and limitations of current data collection and analysis method. Section three introduces the way the Kano model has been used in the context of this study. Section four describes the analysis results and their implications and section five presents the limitations, conclusions and outlook.

Kano Model

Logical Principles of the Kano Model

The core assumption of the Kano model is that the different attributes of a service do not carry equal weights in their contributions to customer satisfaction. Certain attributes, when absent or not well met, could lead to customer dissatisfaction, but when done well, do not lead to higher customer satisfaction. On the other hand, certain attributes may be absent and customers will not be affected, but when present and done well, could lead to dramatic increase in satisfaction. By enabling us to identify these different categories of attributes, one can allocate efforts appropriately across these attributes to optimally achieve customer satisfaction (Chun-Chih & Ming-Chuen, 2010).

Figure 1 illustrates the basic idea of the Kano model, which proposes five categories of attributes that differ in terms of how their fulfilments relate to customer satisfaction. The five categories are "basic factor" (also commonly known as the "hygiene factor"), "performance factor", "excitement factor", "indifferent factor", and "reverse factor".

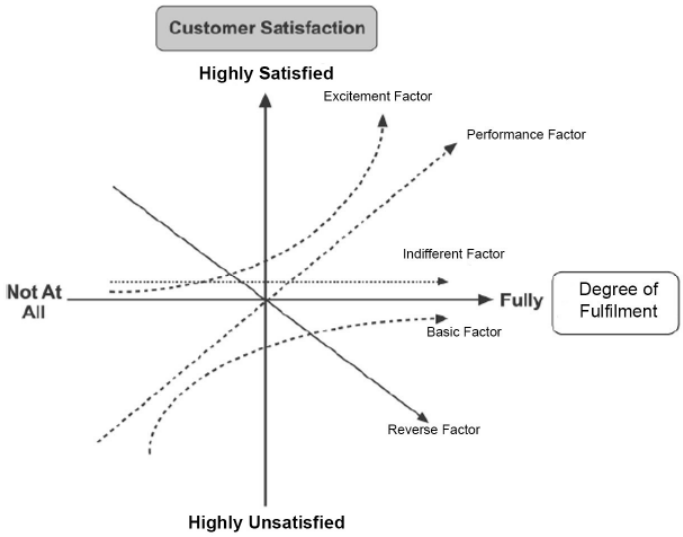

Figure 1. Categories of Quality Attributes in Kano Model

Basic factors are those requirements that, if not fulfilled, will lead to customer dissatisfaction. These are the requirements that customers expect to be an integral part of the product or service. Thus, fulfilling them is often taken for granted by customers and will not lead to a high level of satisfaction level (Bilgili & Unal, 2008). Basic factors are also often described as "qualifier" or "minimum" requirements that must be fulfilled. Using car rental service as an example, a basic factor is the availability of a reserved car upon pick-up at the designated time. Customer expects the car to be available and would not be impressed if the car is unavailable.

Performance factor is the type of quality attribute where the customer satisfaction is proportional to the level of fulfilment – that is, the higher the fulfilment the higher is the level of satisfaction. Performance factors are usually explicitly demanded by customers (Bilgili & Unal, 2008) and are the core of the competition among the companies that provide the service. For example, the cost of car rental is a performance factor. For most customers, customer satisfaction is inversely proportional to the cost of car rental, if everything else is kept as equal.

Excitement factors are the quality attributes which have the greatest influence on how satisfied a customer will be with a given service. Excitement quality are neither explicitly expressed nor expected by the customer (Edgar, Yang, & Geare, 2005). If they are not met, there is no dissatisfaction, because they were not expected in the first place. However, when they are fulfilled, they can delight customers and lead to more than proportional satisfaction. An example of an excitement factor is a free car upgrade. Over time, however, an excitement factor could become a performance factor and finally a basic factor as it becomes a common feature of the services as a result of competition (Löfgren, Witell, & Gustafsson, 2011).

Indifferent factors are those quality attributes that customers are not interested in and thus have no significant impact on satisfaction (Wang & Ji, 2010). For example, the actual colour of the seats might not make a significant difference to the customer of a car rental service. The importance of indifferent factors should not be neglected, however, given that indifferent factors may change into excitement factors or performance factors depending on the success of the marketing strategies used to promote these indifferent factors (Löfgren et al., 2011).

Reverse factors are those quality attributes where a high extent of fulfilment leads to dissatisfaction (Wang & Ji, 2010). For instance, a bigger car engine capacity may lead to higher dissatisfaction as consumers become more environmentally-aware.

The traditional Kano model classifies quality attributes using data from a structured questionnaire. Respondents are asked to rate each attribute regarding two aspects: (1) functional, i.e. how the respondent

feels in the case of fulfilment of the attribute and (2) dysfunctional, which is how the respondent feels in the case of non-fulfilment of the attribute by indicating, for each aspect, one of the responses: "Like", "Expect", "Neutral", "Accept", and "Dislike". For each respondent, the respective responses to the two aspects of each attribute are mapped against a Kano table that matches the responses to a factor classification. For example, a respondent who "Likes" the functional and "Dislikes" the dysfunctional aspect of an attribute is considered to perceive the attribute as a performance factor. A respondent who "Likes" the functional aspect and "Accepts" the dysfunctional aspect of an attribute perceives the attribute as an excitement factor. An attribute's final classification is determined from all the respondents' data based on the frequencies of individual-respondents' categorisations. Thus, an attribute is classified as an excitement factor if there are more respondents who classify it as an excitement factor than as any other factor.

Limitations of the Existing Approach for Kano Model Analysis

While the Kano model has been previously used in the tertiary sector to identify the different aspects of a curriculum that impact upon student satisfaction (Arefi et al., 2012; Bilgili & Unal, 2008; Ching-Chow et al., 2010; Rezaie et al., 2012), the data collection and analysis approach have several drawbacks that constrain the analysis, thereby preventing it from achieving wider adoption and pragmatic applications.

Firstly, existing Kano model's questionnaires require the researcher to predetermine the list of quality attributes to be analysed prior to data collection, usually from other cases or existing literature. This confines the study to known attributes that have been previously documented and neglects the chance of identifying new or unique attributes. The ability to identify new and unique attributes is especially important for educators as student expectations evolve over time (Cannon & Arnold, 1998; Cook & Leckey, 1999). A failure to cope with changing students expectations within the higher education sector leads to poor student retention and a decrease in the numbers of students graduating (Longden, 2006).

Secondly, Kano model's standard instruments require each attribute to be measured by two items--a functional question item and a dysfunctional question item. This leads to a long list of questions and can negatively affect the motivation of participants to respond. For instance, a study that has 35 attributes requires at least 70 questionnaire items (Bilgili & Unal, 2008). In order to maintain an acceptable length of the questionnaire, researchers commonly adopt high-level attributes with each attribute serving as proxy for several multiple low-level attributes (Ching-Chow et al., 2010; Liu, 2008; Rezaie et al., 2012). Such generalization tends to render the resultant analysis to be too abstract to be used by practitioners to infer pragmatic implications. For instance, although the result might show that "assessment feedback" is an important factor for student satisfaction in tertiary education, such a general result makes it difficult to gain actionable insights and to devise specific strategies based on the results gained. For example, what makes a good feedback? Should academic staff strive for timely feedback or detailed feedback?

Thirdly, the current data source used for a Kano model analysis must be obtained through a specially administered questionnaire survey that requires investment of resources and time. More importantly, recruiting sufficient participants for the survey is not a trivial undertaking, especially when it involves a long list of questionnaire items. Consequently, Kano model analyses are conducted infrequently, thus preventing a deeper understanding and continuous improvement of student satisfaction.

Extended Approach for Kano Model Analysis

This section describes the benefits of the proposed extended approach for Kano model analysis and the step-by-step explanation on how the approach can be applied.

Overview and Benefits

Most tertiary education institutions regularly collect feedback from students to assess the level of student satisfaction via questionnaires. Together with the opportunity to provide quantitative feedback, typically on Likert scales, these surveys also offer a channel for students to provide open-ended comments. Students commonly comment on quality dimensions that either impress them or upset them. These comments thus serve as a rich source of data for extracting and categorizing quality attributes.

The proposed Kano-grounded analysis approach below is designed to take advantage of students' feedback. This means the assessment of student requirements can be performed without the need for conducting separate data collection activities. From the research perspective, the reservoir of results from different educational contexts, regions, and points in time could lead to comparative meta-research across the tertiary education sector. This approach enables educators to observe changes in how students perceive the quality of their education over time.

Step-by-step Explanation

The extended approach presented here has been applied successfully in an Australian university. The data source is part of the regular evaluation surveys conducted in the university at the end of every semester. In this paper, only data from the Information Systems School in the university is used. The selection of our study sample also addresses the lack of application of the Kano model to the field of Information Systems education. The data is collected from 26 units[1] and consists of 277 unique student responses.

The method proposed consists of four main steps, namely (1) data preparation, (2) attribute extraction and identification, (3) attribute refinement, and (4) attribute aggregation and classification as explained in the following sections.

Step 1: Data Preparation

For the analysis to be viable, the method requires the following data elements for each unit, which is typically covered by standard feedback surveys:

- Responses to Open-ended Questions

  Opened-ended comments are the data sources for extracting quality attributes. In addition, clues for functional or dysfunctional aspects of an attribute are extracted based on the notion (e.g., positive or negative) used in the comment. In this study, the open-ended comments are obtained from students' responses to the question: "Please provide any feedback you may have about this unit".

- Level of Satisfaction

  A student's level of satisfaction of potential quality attributes is inferred from the student's overall satisfaction level with a particular unit. This data is typically in the form of a 5-point Likert scale, consisting of strongly disagrees, disagree, neutral, agree, and strongly agree. In this study, the item used to elicit the overall satisfaction is "Overall, I am satisfied with this unit".

Step 2: Attribute Extraction and Identification

In order to extract the quality attributes for further analysis, the following processes are carried out:

- Attribute Extraction

  The first process involves extracting attribute(s) from each student's comment. The naming of the attributes should be as specific and detailed as possible. It is critical that generalization of attributes is not made at this stage and that as much as possible of the context and the details of the attribute are recorded. For example, different aspects of assessment such as assessment structure, assessment timing, and assessment rigor are coded separately, rather than generalized into a single high-level attribute (such as assessment design). These details provide insights into specific remedial actions after the analysis is completed.

- Attribute Identification

  The second process involves identifying whether an attribute is "functional" (i.e. fulfilled) or "dysfunctional" (i.e. not fulfilled). An attribute is considered functional when the respondent describes the fulfilment of the quality attribute. Positive notions are often used in the description.

[1] A unit is also known as a course or a subject in other educational institutions.

For example, "a well-structured unit", "well-organized lectures", and "practical assignments" are straightforward examples of functional attributes. On the other hand, an attribute is dysfunctional when the respondent describes its lack or mediocrity. Negative notions are often used to describe the dysfunctional aspect of quality attributes. Examples of dysfunctional attributes are "disappointed with unit as its focus is on soft skills", "obsolete style of teaching", and "learnt nothing from the unit". In addition, extra attention is required to deal with subtle dysfunctional comments. For example, respondents often used constructive feedback to comment on dysfunctional attributes such as "the unit should have clear instructions for assessment". Table 1 shows a sample resultant data table after attribute extraction and identification. "Function" and "Attribute" are the new columns that should be added to the raw data table to record the outputs of the attribute extraction and identification processes.

Table 1. Data table with extraction and coding

Case ID	Row ID	Unit Code	Satisfaction	Function	Attribute	Comments
1	1	XXX005	1	Dysfunctional	Orientation of Unit	I am disappointed with this unit as it's focus is on soft skills (i.e. team work, communication etc.) rather than hard skills (i.e. programming) such as developing an app.
57	2	XXX007	5	Functional	Unit Structure	I thought that this unit was well organised and well run. The only criticism that I would have is in the learning material, why include EPCs? There is little benefit that I could see in this inclusion. Instead, possibly some further detail about the management of processes, various types of process model uses etc. could have been included.
57	3	XXX007	5	Dysfunctional	Learning Materials	I thought that this unit was well-organized and well run. The only criticism that I would have is in the learning material why include EPC's? There is little benefit that i could see to this inclusion. instead, possibly some further detail about the management of processes, various types of process model uses
61	4	XXX009	5	Functional	Teaching Staff	Thoroughly enjoyed the unit. Lecturers and tutors are well-informed, tools made available for us are extremely useful across all other units. Great subject.

Step 3: Attribute Refinement

It is common that a researcher would need to go through several rounds of refinement before arriving at a list of attributes that are sound and mutually exclusive. To avoid missing any important data, the attributes initially identified are necessary very detailed, thus resulting in a long list of attributes that may be coded slightly differently, but are essentially the same. For instance, our initial coding resulted in two separate attributes "selection of content" and "lecture content". After the first round of review of the attributes, these were deemed to be the same and hence combined into a single attribute ("selection of content").

To ensure the reliability of the coding and validity of the resultant attributes, we conducted an inter-coder reliability test based on a percent agreement index (Watkins & Pacheco, 2000). The coding protocol was explained to a second coder before the second coder repeated the processes of attribute extraction, identification, and refinement on randomly selected 30 data samples. After reconciliation between the two coders, an inter-coder reliability of 95.2% was achieved.

Step 4: Attribute Aggregation and Classification

Once the list of attribute is confirmed, we proceed to classify each of the attributes into Kano's model of quality categories, namely excitement, performance, basic, indifferent, and reverse factors. Our approach in attribute classification differs from the traditional approach in two aspects: (i) the order of data aggregation vs. classification and (ii) the statistical criteria used in classification.

Firstly, the traditional approach classifies each attribute at the respondent level first before they are aggregated (based on frequencies) across the respondents to determine the final classification of an attribute. In our approach, we aggregate responses across the respondents first before making a determination of the classification of an attribute. In the traditional approach for Kano model analysis, the possible responses to the functional and dysfunctional questions are categorical ("Like", "Expect", "Neutral", "Accept", and "Dislike") and can be mapped directly to the actual classification of an attribute. In our approach, a student's reaction to the functional or dysfunctional aspects of an attribute is inferred from his or her satisfaction level, which is ordinal and does not match directly to the possible categorical responses in the Kano model. As a result, we are unable to use Kano model's mapping directly. Thus, we need to infer the classification of an attribute based on the satisfaction data. In order to increase the confidence of our inference, we first aggregate and average all the responses across the respondents before inferring the classification of an attribute.

Secondly, in the traditional approach, the final classification of an attribute is based on only the relative counts of how often an attribute is particularly classified across the respondents, without consideration for the statistical power of the inference. For example, an attribute is classified as a performance factor even if the number of respondents that classify it as performance is only one more than the number of respondents that classify it otherwise. Our approach uses stronger statistical criteria (t-test) for differentiation between classifications.

In summary, the differences in our approach to attribute classification are partly due to the differences in the nature of the data used, but are also motivated by the opportunity to increase the statistical power of the analysis results. Two processes involved in attribute classification step are:

- Attribute Aggregation

  To aggregate the data, we use a Pivot table as shown in the example in Figure 2. The satisfaction scores for the functional and dysfunctional aspects of every attribute are averaged. For example, consider the attribute "assignment method". The satisfaction scores from all the data rows associated with this attribute coded "dysfunctional" (in this case, there were six rows with ID 18, 42, 139, 259, 271, and 273) are averaged to get the mean satisfaction value (which is 3.1667). Similarly, satisfaction scores from the rows (ID number 7 and 263), which are coded "functional" are averaged to obtain the mean satisfaction value associated with the functional aspect of the attribute. The same computation is applied to every attribute.

Value: Average of Satisfaction Scores	Fulfillment	
Attribute List	Dysfunctional	Functional
⊟Assessment Method	3.1667	3.5000
7		5.0000
18	3.0000	
42	3.0000	
139	4.0000	
259	4.0000	
263		2.0000
271	2.0000	
273	3.0000	
⊞Assessment Rigor	2.6667	4.0000
⊞Assessment Structure	3.6364	4.1429
⊟Assessment Timing	4.7500	
44	5.0000	
52	5.0000	
171	4.0000	
249	5.0000	
⊞Assignment Scenario	3.0000	5.0000
⊞Big Picture	4.0000	
⊞Challenging	3.3333	5.0000
⊞Clarity of Instruction	2.8750	
⊞Contemporariness of Content	1.8571	
⊞Content (Amount)	3.0000	4.2000
⊞Delivery Methods	2.5000	4.7333

Figure 2. Exemplary Data Aggregation

- Attribute Classification

  Following the logical principles of Kano model, the classification of an attribute is based on the relative perceptions of the functional and dysfunctional aspects of an attribute. Our approach, as explained earlier, uses the average satisfaction scores to determine these perceptions. In essence, the approach involves first testing if the difference in the average satisfaction scores of the functional and dysfunctional aspects is significant (using t-test assuming equal variances). If they are not significantly different, we conclude that the attribute is an indifferent factor. This is consistent with the logic of the Kano model in that regardless of whether these attribute are well fulfilled or not, they do not have significant impact on students' satisfaction.

  If the difference is significant, it means the respondents feel differently whether an attribute is fulfilled or not, thereby suggesting that the attribute belongs to one of the other categories. For example, a performance factor is one where fulfilment leads to satisfaction while lack of fulfilment leads to dissatisfaction. A basic factor is one where fulfilment does not result in satisfaction, but lack of fulfilment leads to dissatisfaction. An excitement factor, on the other hand, is one where lack of fulfilment does not lead to dissatisfaction but fulfilment leads to high level of satisfaction. Thus, we need to further determine the actual impact of the functional and dysfunctional aspects of the attributes on satisfaction, and establish if an aspect is perceived as satisfactory or not. This requires defining the score threshold for distinguishing between satisfactory and unsatisfactory aspects. As the neutral point in our satisfaction scale is 3, it was used as a cut-off point for the distinction and average satisfaction score of 3 or above is considered as satisfactory, while a satisfaction score less than 3 is considered as unsatisfactory.

  Using the above criteria, Figures 3(a)-3(d) depict the four possible scenarios by which an attribute's average functional and dysfunctional scores may be "positioned" and the resultant classification. In the figures, the horizontal axis is divided in the middle into two sections with the left representing the dysfunctional aspect and the right representing the functional aspect. The vertical axis represents the average satisfaction score and is also divided in the middle by the neutral score with the top half representing the satisfactory zone and the lower half the

unsatisfactory zone. The circle in the left half represents the average score of the dysfunctional aspect of an attribute while the right represents the average score of the functional aspect of the attribute.

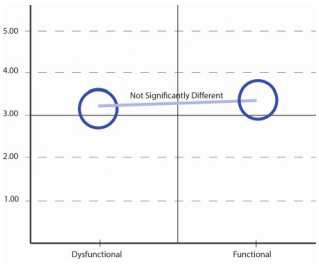

Figure 3 (a) – Indifferent

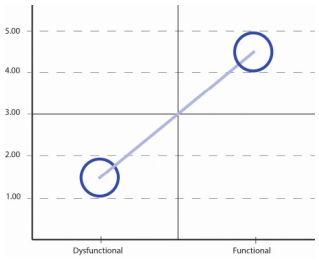

Figure 3 (b) – Performance

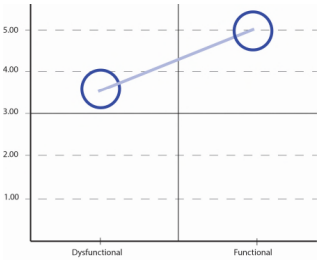

Figure 3 (c) – Excitement

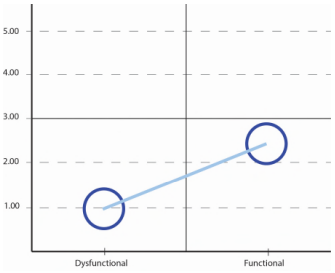

Figure 3 (d) – Basic

Figure 3(a) depicts an "indifferent factor", where the average functional satisfaction and dysfunctional satisfaction scores are not significantly different. An example of this is "assessment structure" where the satisfaction score is 4.14 on the functional aspect and 3.63 on the dysfunctional aspect. The result of the t-test showed the satisfaction scores are not statistically different (p-value = 0.399).

Figure 3(b) indicates a "performance factor" where the functional score falls into the satisfactory zone (i.e. upper quadrant) and the dysfunctional score falls into the dissatisfactory zone (i.e. lower quadrant), and the difference is statistically significant. An example for this is "elaborateness of lecture" where the mean value of the satisfaction score is 4.00 on the functional side and 2.5 on the dysfunctional side (p-value of t-test = 0.048).[2]

Figure 3(c) indicates an "excitement factor", i.e. the average satisfaction scores of both functional and dysfunctional aspects are in the satisfactory zone. An example for an excitement factor is "assessment scenario" where the average functional score is 5.0, and the dysfunctional score is 3.0 (p-value of t-test = 0.0286). This is consistent with the principles of Kano model of an excitement factor, which even if not fulfilled or under-fulfilled, will not cause dissatisfaction. On the other hand, there will be a remarkable increase in student satisfaction, if the excitement factor is well fulfilled.

Figure 3(d) indicates a "basic factor", where the average satisfaction scores of both functional and dysfunctional aspects are below the satisfactory level. Again, this is in line with the Kano model. If the basic factor is poorly-fulfilled or not fulfilled, it will lead to great dissatisfaction, but there is no significant increase in satisfaction even if the factor is well fulfilled.

[2] A reverse factor, which is not found in our study, would be one where the position of the functional and dysfunctional score is reversed—i.e. the dysfunctional score is in the satisfactory zone and the functional score is in the unsatisfactory zone.

The above scenarios account for about 55% of the attributes in our sample. However, as noted in Figure 2, several attributes, for example, 'Assessment Timing', 'Clarity of Instruction', and 'Contemporariness of Content' record only one aspect (in these examples, they are all dysfunctional). As a result, we need to interpret these attributes differently. The basic assumption underlying our approach for classifying these attributes is that, if comments on either the functional or dysfunctional aspect is absent, it is because students are neither concerned with the fulfilment nor non-fulfilment of the attribute.

Figure 4 depicts the four possible scenarios for attributes with only a score on one of the aspects.

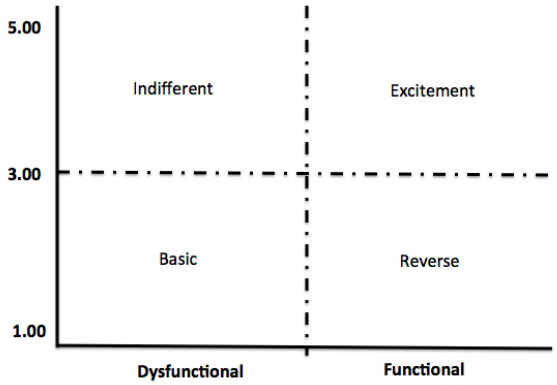

Figure 4. Four Possibilities for Attribute with Only one of the Aspects.

An "indifferent factor" is an attribute that, despite only listed as dysfunctional, still has a high average satisfaction score. We conclude that this attribute does not seem to have any significant impact on satisfaction even when it is not fulfilled. For instance, although the attribute "up-to-date material" is generally perceived as dysfunctional in our data (i.e. all the comments pertain to material not being updated), it still has an averaged satisfaction score of 4.0.

An "excitement factor" has only a high functional satisfaction score. As an example, "responsive feedback" has an averaged satisfaction score of 4.75 on the functional aspect. The rationale is that when these attributes are fulfilled, it results in high student satisfaction and excitement. However, even if it is unfulfilled, it was not mentioned, because excitement factors are not usually expected by the students and are unlikely to be commented on by students when they are absent.

A "basic factor" has an unsatisfactory dysfunctional score. An example is "contemporariness of content" that has a dysfunctional score of 1.86. This is consistent with the logic of the basic factor in the Kano model, where the underperformed basic factor leads to great dissatisfaction. Attributes belonging to a basic factor are taken for granted when well-performed. Thus, students will not feel excited and are unlikely to bother to comment on the presence or fulfilment of the attribute.

A "reverse factor", despite being fulfilled, might still obtain an unsatisfactory score. No such factor was found in this study.

Data Analysis

This section presents the results of our analysis of the Information Systems School's student evaluations using the proposed approach. We also compare our findings against other empirical studies that have used the Kano model to classify quality attributes in teaching and learning: Liu (2008), who studied university education quality at a department level, Arefi et al. (2012), who classify the quality of education of a master degree's program, and Rezaie et al. (2012), who focused on the quality of an e-learning system. Attributes that are not relevant to teaching and learning (e.g. closeness to city and sufficiency of car park) are not included in the comparison. Our findings suggest that the proposed method is capable of not only

confirming attributes that have been previously identified in the literature, but also uncover new attributes that may be unique to an Information Systems program.

Table 2. Excitement Factors Compared to Other Studies

Attributes	Descriptions	Liu	Arefi	Rezaie
Assignment Scenario	Scenario / cases used in the assignment. For example, is the scenario able to give a sense of a real world problem			
Content (Amount)	Whether the amount of content is appropriate and reasonable			
Empowerment	Students are empowered in their learning process			
Feedback on Assessment	Comprehensiveness and quality of the feedback regarding assessment			
Forward Compatibility	Students perceive that the unit prepares them for upcoming units			
Interaction in Lecture	Interactivity in lecture		Excite	Excite
Issues Solving by Staff	How attentive is the staff in solving students' issues	Perform		
Lecturer's Attribute	Attributes and characteristics of lecturers		Perform	
Practicality	Practicality of the unit	Basic		
Resource Provision	Extent to which other resources such as tools, software, further equipment are provided	Excite		
Responsive Feedback	Responsive to student's emails and queries. This includes the responsiveness of assessment feedback.			
Teamwork exercise	Management and conduct of teamwork assessment			
Unit Overall Cohesiveness	Unit cohesiveness in overall study program (e.g. how well the unit integrates with other units and its order in the program)		Basic	

Table 2 shows the excitement factors found in this study and how these factors are categorized in other studies. As observed in Table 2, in addition to factors that have also been discovered by other studies, our approach has uncovered several excitement factors that have not been previously identified. This is not surprising, because excitement factors are, by definition, often not explicitly demanded by students, and unless they have been documented in literature, are often not included in Kano studies. However, as our approach takes advantage of open-ended comments by students, it is not similarly constrained. It is also noteworthy that four of our excitement factors were classified differently in other studies. I*ssues solving by staff,* and *lecturer's attributes* were previously categorized as performance factors, while *practicality* and *unit overall cohesiveness* were previously categorized as basic factors. A potential explanation for these differences is that students' expectations may vary across the programs of study, institutions, and regions. For example, cultural differences, trends and expectations of the industry, or different states of technological innovation in different regions could render different student expectations. This highlights the importance of each individual institution conducting its own Kano study to understand the quality attributes that satisfy their students rather than just relying on existing literature.

Table 3. Comparing Performance Factors to other Studies

Attributes	Descriptions	Liu	Arefi	Rezaie
Delivery Methods	Delivery methods / presentation of the unit contents to students by teaching staff	Perform		
Elaborateness of Lecture	Elaborateness of lecture contents. The extent to which the teaching staff explains the lecture content in details and provide clear examples.	Perform		
Selection of Content	Choices of content for the lectures			
Staff Competency	Competency and skills of staff (includes lecture, unit coordinator, and tutors)			
Tutorial Structure	Organization / structure of tutorial sessions	Perform		

Tutors' Attributes	Attributes of tutors / teaching assistants	Perform		
Unit Structure	Overall unit structure / organization	Basic		Basic

Table 3 depicts how the performance factors found in this study are categorized by other studies. Most of these attributes, such as *delivery methods*, *elaborateness of lecture*, *tutors' attribute*, and *tutorial structure* are consistently being categorized as performance factors in other studies. This finding further highlights the legitimacy of the proposed method for uncovering Kano quality attributes.

Table 4. Comparing Basic Factors to other Studies

Attributes	Description	Liu	Arefi	Rezaie
Assessment Rigor	Rigor of the assessments. Whether the assessment is evaluated with rigor and in a fair manner. Whether the criteria used to evaluate student performance are in line with the learning objective.		perform	
Clarity of Instruction	Clarity of instruction for assignments			
Contemporariness of Content	Contemporariness of unit content (whether it is catching up with the industry trend)			
Material Provision	Adequate learning material and resources are provided			
Technical Content	The adequacy of technical content in a unit			
Unit Alignment	Alignment between the lecture, tutorial, and workshop sessions. This includes the coordination between the teaching staff.		Basic	Indiffer

Table 4 shows the basic factors found in this study and how they are categorized by other studies. While Arefi et al. (2012) have categorized *unit alignment* as a basic factor in their study, Rezaie et al. (2012) have categorized it as an indifferent factor. Moreover, Rezaie et al. (2012) have categorized *assessment rigor* as a performance factor. These discrepancies may be attributed to several reasons. Firstly, student expectations are likely to differ across different regions. Previous studies were conducted in an Asian and Middle Eastern context, which is vastly different from the rather Anglo-Saxon context of this study. Secondly, the discrepancy could be the result of an evolution of quality attributes over time including the emergence of digital natives. For instance, *assessment rigor*, which was previously perceived as performance factor has become a basic factor over time. The current university, for example, makes explicit the learning objectives and outcomes of each unit and clearly highlights the links between the assessment items and these learning outcomes in all official descriptions of the unit contents.

Table 5 shows the indifferent factors in this study and how these factors were categorized by the other studies. Again, the findings highlight the legitimacy of the method while yet capable of uncovering new factors that would not have been identified, because they were not described in the literature.

Table 5. Comparing Indifferent Factors to other Studies

Attributes	Descriptions	Liu	Arefi	Rezaie
Assessment Structure	Structure of the assessments in the unit. This includes whether the type of assessment is appropriate to measure knowledge learnt in the unit and the order of assessments.		Indiffer	
Assessment Timing	Timing of assignment being given to students, and the appropriateness of due dates.			
Big Picture	Unit is delivered in a way that students are able to appreciate the big picture of the unit content			
Challenging	Challenging tasks / assignments / unit content		Indiffer	
Exam Structure	Structure and organization of examination			
Exam Timing	Timing of examination		Indiffer	
Extra Assistance	Provision of additional assistance (e.g. more helpful practical sessions, extra help for students who face learning difficulties)			

Learning Outcome	Overall learning outcome as perceived by students			
Lecture Duration	Appropriateness of lecture duration			
Lecture Schedule	Appropriateness of the schedule for lecture sessions (e.g. early morning, night, weekend)			
Organization of material	How the material is organized in the supporting system (e.g. Blackboard)			
Outline of Unit	Outline of unit is clearly presented to students at the beginning of the semester and followed throughout the conduct of the lectures			
Technology Dependency	Constrained to specific technology for the purpose of teaching / practical			
Up-to-date Material	The extent to which all teaching material is updated (e.g. showing the correct year and semester)		Perform	
Tutorial Duration	Appropriateness of the tutorial duration			
Unit Impression	The extent to which a unit is perceived to deliver what it appeared to offer			

Table 6 shows the factors investigated in other studies, but not covered in this study. An explanation for the absence of previously identified excitement factors in our study, such as *divergent achievements,* is that these attributes were not expected in the first place and no comments were made on these attributes. Additionally, consistently reported basic factors found in previous studies such as *more options for selective courses* and *opportunities for further study*, are already addressed well in the current program and since students took those fulfilments for granted, they did not make any comments about these attributes. While we also note that several performance factors in other studies were absent from our list, these factors do not appear to be consistent across other studies as well (for example, *ICT Infrastructure* is considered as performance in Liu (2008) and basic in Arefi et al. (2012) while *enable meta-learning* is only reported in Arefi et al. (2012)), suggesting that they may not be similarly applicable in all contexts.

Overall, while our method did not discover some of the factors that were already reported in the previous literature, these factors are either those that are not expected by the students in the first place (i.e. excitement factors) or those that are expected, but are already performing well and hence were not commented upon. In both cases, these are factors that do not require immediate attention, and hence are less important than those factors that our approach actually uncovers.

Table 6. Attributes that Exist Only in Other Studies

Attributes	Descriptions	Liu	Arefi	Rezaie
Technology-aided Teaching	Staff's competency in using technology such as multimedia and computers to facilitate learning and teaching.	Excite		
Divergent Achievements	Enable students to achieve learning outcomes in various aspects	Excite	Excite	
Continuously Organized Courses	Well established courses with solid structure and materials	Excite		
Physical learning environment	Learning environment and facilities such as library, classroom, supporting facilities (car park, entertainment, closeness to city, and accessibility to public transport).	Perform	Basic	
ICT Infrastructure	Information and communication technology provided to the students. This includes internet network access, lab computers, and apparatus required.	Perform		Basic
Enable meta-learning	Enabling students to understand how to learn, instead of focus on what to learn		Perform	
More Options for elective Courses	Wide range of elective courses is available	Basic	Basic	
Opportunities for Further Study	Prospective of further study	Basic	Basic	

More Scientific Courses	More scientific-based courses are offered		Indiffer	
Pedagogy Regulation	Regulation and rules on teaching methods			Indiffer

Implications for Information Systems (IS) Teaching

Our approach and consequent findings on new factors enable us to not only draw the following specific guidelines for IS teaching practices, but also to prioritize our effort in improving student satisfactions.

For example, the basic factors *clarity of instructions*, *unit alignment,* and *contemporariness of content* suggest that the following practices would serve the basic needs of our students and therefore all effort must be made to ensure that they are in place.

Provide clear instructions on assessments

While there are some students who are not concerned with how well they perform in the university, majority of our students do, and being able to do well in assessments is a key concern of these students. As a result, they become frustrated when they believed that they were unable to perform well because the instructions to the assessments are unclear. ("*The assessment pieces were too vague in terms of what they wanted*"–rating 1; "*The assignments are so vague, I feel like they are completely open-ended with no direction at all*"–rating 2; "*The premise of the unit was too vague. I had no idea what fit within the scope of the unit*"–rating 2). It is thus imperative that mechanism is in place to ascertain the clarify of assessment instruction, for example, by seeking feedback from more senior students when the assessment instructions were written, or to obtain feedback regarding students' understanding of their assessments once they are released.

Ensure different learning activities are aligned

Relating to assessment is another basic need of students for the teaching material to be timed and aligned with the assessment requirements ("*Most of the times the course material didn't cover everything we needed for the assignments or it was covered after the assignment was due*"–rating 1, "*I also disliked the way the unit did not teach subject matter that was crucial to the assignment tasks until shortly before the assignment was due*"–rating 2). It is thus crucial that content and assessments are carefully considered together and planned early on to ensure that all the learning activities and content are useful towards supporting the students' abilities to complete their assessments.

Update material regularly to ensure contemporariness

IS students appear to be knowledgeable about the competency of the teaching staff and the IS domain. Thus, they expect to be provided with contemporary and updated content and are dissatisfied when the material presented is not ("*very outdated subject as no … companies use these methods anymore*"–rating 1, *"…content that will date quickly and eventually be useless*"–rating 1, "*Material seems out of date and not overly relevant*"–rating 2). It is thus imperative that content is reviewed and updated regularly, or we run the risk of making IS education irrelevant to students.

In addition, our study also reveals some important performance factors, such as *staff competency*, which is sometime compromised due to the trade-off between the need for expertise in a subject versus that for a research area (Ramsden & Moses, 1992). In light of this finding, however, this trade-off needs to be considered carefully. The detailed comments by students also provide an insight into how this trade-off can be mitigated.

Assign staff to teaching units in which they have industry-based competency

Our students are unhappy when they believe the staff is not sufficiently competent ("In a few occasion, the lecturer/tutor/presenter are not familiar/clear on the topic they are talking" – rating 1). Furthermore, being an applied domain of study, IS students value and appreciate industry-based competency ("The teaching team did an amazing job, it shows that their current industry knowledge helped them deliver a unit which could have been horrible." – rating 5). This suggests that allocations of teaching staff should be based on competency rather than availability, and where competency is not available from among the academic staff, involving sessional teaching staff from the industry could result in better student satisfaction.

Finally, our findings on the excitement factors, *assignment scenario*, *assignment feedback, responsive feedback,* and *forward compatibility* allow us to draw the following guidelines, which should be considered after the basic and performance factors have been fulfilled as they delight students and could enhance students learning experience substantially.

Provide timely feedback to students

Although the IS teaching profession recognises the importance of providing detailed and yet timely feedback to students' work, due to the competing demands for their time, they are generally unable to do both (Ramsden & Moses, 1992). Our finding enables us to determine that since both are excitement factors i.e. the lack of fulfilment of either factor would not lead to dissatisfaction ("The lack of formal structured feedback is very difficult as you effectively go [through] the entire semester and hope on a wing and a pray that you pass"—rating 3) and their fulfilment would lead to delight ("*…Excellent verbal and written feedback. Helpful lecturer. Assessment returned promptly*"—rating 5), effort can perhaps be more effectively allocated to the fulfilment of just one of the factors. As evidence in the literature suggests that detailed feedback are not necessary effective in improving students' learning (Jiao & Brown, 2012), it is recommended that should a trade-off be necessary, it might be more effective to thrive for timely and responsive feedback instead of detailed feedback.

Develop exercises and assignments that are real and practical

Students have perhaps become accustomed to problems and cases that are sanitised to reduce complexity or noises but as a result have become void of reality and too simple or abstract (Mann & Robinson, 2009) and hence do not expect real problems. However, as our findings suggest, students do appreciate problems and cases that are real or realistic ("*I like that case study, as I can find more useful information from the real society*"-rating 5, "*I found the assessment case study too abstract and it would have been easier to relate the project management framework to a less ambiguous and confusing scenario. In the case provided, it was very unclear what the project actually involved/required*"-rating 4). Thus, it is suggested that realistic cases, similar to those used in MBA classes, might also be appropriate for our IS students, if they are not already being used.

Ensure that there is clarity in the future value of a unit

While not essential, students are delighted if they are able to tell how a unit they are doing would serve them in the future, either because it prepares them for other units that they have to undertake later in their course or for future career prospects. ("*Enjoyed the unit and think that the content is a good foundation for other units*"- rating 5; "*This subject has provided me with an insight as to what I can achieve both in university and in my future career.*" – rating 5). This requires course-level coordination and clear communication to all the academic staff involved in teaching related units so that they are able to highlight the relationship between their units and other units, as well as the relevance of their units to the course and career outcomes.

In summary, our findings suggest that IS students expect material that is updated and contemporary, and teaching staff that is competent with industry experience to deliver these materials. Furthermore, where assignments are concerned, they demand clarity on assignment requirements, and the material required for completing assignments to be covered before they complete their assignments, and value cases that are real. While they do not demand them, students are nevertheless delighted when they are able to receive feedback to their works in a timely manner, and see how the units they are undertaking relate to later units or future career prospects.

Discussion

This section highlights the contributions of our research, its limitations, and future research work as well as some concluding remarks about the value of our Kano approach.

Contributions

The extended approach for Kano model analysis and the identified factors presented here make a number of important contributions. First, it sensitizes lecturers for the need to differentiate alternative sources of satisfaction in alignment with the principles of Kano model. Second, the different factors allow individuals

in charge to conduct factor-specific root-cause analyses for low ranking units. Third, basic factors need to be obviously in place, before a lecturer can capitalize on excitement factors. As such, these factors also provide a channel to prioritize efforts related to the (re-)design of a unit. Fourth, ongoing longitudinal studies using this method will help monitor the extent to which excitement factors convert into basic factors. This can be typically observed with blended learning approaches where the initially advanced use of supporting technologies over time becomes a commodity (for example, ICT infrastructure is found to be a performance factor in Liu (2008) but is classified as basic four years later in Rezaie et al. (2012)). Such developments point to an ongoing need to innovate the technologies and digital channels for the delivery of teaching contents.

Limitations and Future Work

Similar to other evaluations where respondents perceive them as opportunities to provide feedback for improvement, comments given in such surveys tend to be more negative than positive. It is therefore very likely that there are many attributes that are being done well, but are not mentioned by the students at all. Thus, the proposed approach may not be suitable for uncovering all the basic factors (recall that a basic factor is one where a student will comment negatively on it, if it is not done well, but is unlikely to mention it, if it is done well). However, it is a useful approach for discovering basic factors that are not being done well and hence identifying areas for immediate improvement.

In addition, it is common to find multiple functional and dysfunctional attributes within a comment made by a student. It is assumed in the current approach that the satisfaction score indicated by the student is applied equally to each of these attributes as it is currently not possible to tease out how the different attributes contribute to the overall satisfaction score. As a result, it is possible that a functional attribute that is coded from a compound comment, which includes other dysfunctional attributes, may be associated with a lower satisfaction score, because the student's overall satisfaction score has been tainted by dysfunctional attributes. Likewise, a dysfunctional attribute may have scored higher, because it has been made as part of a comment by a student who is satisfied by other functional attributes. While this has been partly addressed by first aggregating the data to reduce the within-subject bias, there is still indeed an uncertainty as to what extent our results may have been influenced by this assumption. However, considering the approach we used in comparing the functional and dysfunctional scores to classify an attribute, we believe this assumption would impact mostly the indifferent factors, where the insignificant differences between the functional and dysfunctional scores might be the result of muted functional score and inflated dysfunctional score. Thus, the results on indifferent factors should be considered with caution.

Conclusion

Although the proposed method requires further development, it has already provided us with several useful actionable insights. This study enables us to investigate a greater number of attributes without requiring an increase in the number of questionnaire items. In addition, our approach has identified a number of quality attributes that were previously unidentified, some of which applied to course level teaching and planning. Finally, as the extended approach uses finer-grained data, it enables us to relate specific problems to the factors formulate specific teaching and learning strategies and related action plans. In summary, the proposed approach for Kano model analysis is able to provide greater practical value for the tertiary education sector in continually understanding and addressing students' changing needs.

References

Arefi, M., Heidari, M., Morkani, G. S., & Zandi, K. (2012). Application of Kano Model in Higher Education Quality Improvement: Study Master's Degree Program of Educational Psychology in State Universities of Tehran. *World Applied Sciences Journal, 17*(3), 347-353.

Bilgili, B., & Unal, S. (2008). *Kano Model Application for Classifying the Requirements of University Students* Paper presented at the 7th Annual MIBES International Conference, Greece.

Cannon, J. A., & Arnold, M. J. (1998). Student Expectations of Collegiate Internship Programs in Business: A 10-Year Update. *Journal of Education for Business, 73*(4), 202-205. doi: 10.1080/08832329809601630

Ching-Chow, Y., Sukwadi, R., & Pen-Po, M. (2010, 24-26 Aug. 2010). *Integrating Kano Model into Customer-Oriented Reputation Model in Higher Education*. Paper presented at the Management and Service Science (MASS), 2010 International Conference on.

Chun-Chih, C., & Ming-Chuen, C. (2010, 25-28 July 2010). *An extended Kano model for deciding improvement priority of product attributes*. Paper presented at the Computers and Industrial Engineering (CIE), 2010 40th International Conference on.

Cook, A., & Leckey, J. (1999). Do Expectations Meet Reality? A survey of changes in first-year student opinion. *Journal of Further and Higher Education, 23*(2), 157-171. doi: 10.1080/0309877990230201

Edgar, F., Yang, C., & Geare, A. J. (2005). The refined Kano's model and its application. *Total Quality Management & Business Excellence, 16*(10), 1127-1137.

Gruber, T., Reppel, A., & Voss, R. (2010). Understanding the characteristics of effective professors: the student's perspective. *Journal of Marketing For Higher Education, 20*(2), 175-190.

Hwarng, H. B., & Teo, C. (2001). Translating customers' voices into operations requirements - A QFD application in higher education. *International Journal of Quality & Reliability Management, 18*(2), 1995-1226.

Jiao, H., & Brown, N. (2012). *Providing the right feedback to the right students: applying an innovative e-Assessment system in engineering education* Paper presented at the Association for Australasian Engineering Education (AAEE) 2012 Conference, Melbourne, Australia.

Liu, M.-S. (2008). Using the Refined Kano's Model to Measure University Education Quality: The Case Study on the Department of Food and Beverage Management in Southern Taiwan. *The Business Review, Cambridge, 11*(1), 111-117.

Löfgren, M., Witell, L., & Gustafsson, A. (2011). Theory of attractive quality and life cycles of quality attributes. *The TQM Journal, 23*(2), 235-246.

Longden, B. (2006). An Institutional Response to Changing Student Expectations and their Impact on Retention Rates. *Journal of Higher Education Policy and Management, 28*(2), 173-187. doi: 10.1080/13600800600751044

Mann, S., & Robinson, A. (2009). Boredom in the lecture theatre: An investigation into the contributors, moderators and outcomes of boredom amongst university students. *British Educational Research Journal, 35*(2), 243-258. doi: 10.1080/01411920802042911

Ostrom, A. L., Bitner, M. J., & Burkhard, K. A. (2011). Leveraging Service Blueprinting to Rethink Higher Education *Center for American Progress*. Washington, DC.

Ramsden, P., & Moses, I. (1992). Associations between research and teaching in Australian higher education. *Higher Education, 23*(3), 273-295. doi: 10.1007/BF00145017

Rezaie, M., Nosratabadi, H. E., & Fazlollahtabar, H. (2012). Applying KANO Model for Users' Satisfaction Assessment in E-Learning Systems: A Case Study in Iran Virtual Higher Educational Systems. *International Journal of Information and Communication Technology Education (IJICTE), 8*(3), 1-12. doi: 10.4018/jicte.2012070101

Sahney, S. (2011). Delighting customers of management education in India: a student perspective, part I. *The TQM Journal, 23*(6), 644-658.

Wang, T., & Ji, P. (2010). Understanding customer needs through quantitative analysis of Kano's model. *International Journal of Quality & Reliability Management, 27*(2), 173-1874.

Watkins, M., & Pacheco, M. (2000). Interobserver Agreement in Behavioral Research: Importance and Calculation. *Journal of Behavioral Education, 10*(4), 205-212. doi: 10.1023/A:1012295615144